

TERAHERTZ TRANSCEIVERS AND METHODS FOR EMISSION AND
DETECTION OF TERAHERTZ PULSES USING SUCH TRANSCEIVERS

ABSTRACT

A system for emitting and detecting terahertz frequency electromagnetic pulses. The system comprises a single transceiver device, which may be an electro-optic crystal or photoconductive antenna, for both emitting and detecting the pulses. A related method comprises using a single transceiver device to both emit and detect electromagnetic terahertz frequency pulses. The transceiver device is excited by a pump pulse to emit a terahertz output pulse, which is modulated with a chopper. An object reflects the terahertz pulse and the reflected pulse is detected in the transceiver using a probe pulse. A lock-in amplifier set to the same frequency of the chopper is used to reduce noise in the signal detected by the transceiver. An image of the object may be created using the intensity or the timing of the peak amplitude of the terahertz pulses reflected from the object.